Claims

1. A method for measuring a flow in a pump system, in which a liquid flow is generated by means of a pump and the pump is actuated by an electric drive, in which the rotation speed of an alternating-current motor is controlled with a control unit, **characterised** in that the method comprises

- measuring (402) the pump (P) power in the pump system,
- measuring (504) the liquid pressure (H),
- measuring the speed rotation (v) of the pump,
- determining a first estimate (410, 416) of the liquid flow on the basis of the measured pump power (P) and rotation speed variables,
- determining a second estimate (514, 516) of the liquid flow on the basis of the measured liquid pressure (H) and rotation speed variables and
- determining the flow measurement result by logical selection or any other predetermined function on said first and second estimate.

2. A method as defined in claim 1, **characterised** in determining a first flow value range and a second flow value range, said first estimate being selected as the measurement result if the flow measurement result of the preceding measurement is within the first flow value range, and said second estimate being selected as the flow measurement result if the measurement result of the preceding measurement is within the second flow value range.

3. A method as defined in claim 2, **characterised** in that said first flow value range and second flow value range are selected such that, in the first flow value range the absolute value of the flow change sensitivity to a specific relative power change is lower than the absolute value of the sensitivity to the same relative change in the liquid pressure, and in that in the second flow value range, the absolute value of the flow change sensitivity to a specific relative liquid pressure change is lower than the absolute value of the sensitivity to the same relative change in the power.

4. A method as defined in claim 1, **characterised** in that each flow value is determined both on the basis of the liquid pressure and of the power, the result of the flow value being a predetermined mathematical function of the flow values obtained on the pressure and the power.

5. A method as defined in claim 4, **characterised** in that said mathematical function is a mean value.

6. A method as defined in claim 1, **characterised** in that the frequency of the current supplied to the alternating-current motor is measured and the rotation speed of the motor is determined on the basis of the measured supply frequency.

7. A method as defined in claim 1, **characterised** in that the supply current and supply voltage of the alternating-current motor is measured and the power (P) of the alternating-current motor is determined on the basis of the measured current value (I) and voltage value (U).

8. A method as defined in claim 1, **characterised** in that, with a view to determining the liquid pressure (H), a first static pressure value of the liquid prevailing in the pump input is measured and a second static pressure value of the liquid prevailing in the pump output is measured, and said liquid pressure value is formed by determining the difference between the second static pressure value and the first static pressure value.

9. A method as defined in claim 1, **characterised** in that, with a view to determining the liquid pressure (H), a first static liquid pressure value prevailing in the pump input is measured and a second static liquid pressure value prevailing in the pump output is measured, the value of the dynamic pressure is determined, and said liquid pressure value is formed by determining the difference between the second static pressure value and the first static pressure value and by adding the dynamic pressure value to the obtained difference.

10. A method as defined in claim 1, **characterised** in that the calculation of the flow value is performed in the control unit and that the control unit is a frequency converter.

11. An arrangement for measuring the flow in a pump system comprising a pump (240) for generating a liquid flow, an electric drive for actuating the pump, the electric drive comprising an alternating-current motor (230) and a control unit (220) for controlling the rotation speed of the alternating-current motor, **characterised** in that the arrangement comprises

- means (221, 223) for measuring the pump power (P) of the pump system,
- means (244, 245) for measuring the liquid pressure (H),
- means (221, 223, 228) for measuring the rotation speed (v) of the pump,
- means (221, 222) for determining a first estimate of the liquid flow on the basis of the measured pump power and pump rotation speed variables,
- means (221, 222) for determining a second estimate of the liquid flow on the basis of the measured liquid pressure and rotation speed variables and
- means (221, 222) for determining the flow measurement result by logical selection or any other predetermined function on said first and second estimate.

12. A measurement arrangement as defined in claim 11, **characterised** in comprising means (222) for storing the first flow value range and the second flow value range, provisions being made for selecting said first estimate as the flow measurement result if the flow measurement result of the preceding measurement is within the first flow value range, and provisions being made for selecting said second estimate as the flow measurement if the flow measurement result of the preceding measurement is within the second flow value range.

13. A measurement arrangement as defined in claim 12, **characterised** in that said first flow value range and second flow value range have been disposed to be selected such that, in the first flow value range, the absolute value of the flow change sensitivity to a given relative power change is lower than the absolute value of the sensitivity to the same relative change in the liquid pressure, and that in the second flow value range, the absolute value of the flow change sensitivity to a given relative pressure change is lower than the absolute value of the sensitivity to the same relative change in the power.

14. A measurement arrangement as defined in claim 11, **characterised** in that each flow value is disposed to be determined on the basis both of a first estimate and a second estimate, and the result of the flow value is a predetermined mathematical function of the flow values obtained on the pressure and the power.

15. A measurement arrangement as defined in claim 14, **characterised** in that said mathematical function is a mean value.

16. A measurement arrangement as defined in claim 11, **characterised** in that the control unit (220) comprises means (223, 228) for measuring the frequency of the current supplying the alternating-current motor and means (221, 222) for determining the rotation speed of the motor on the basis of the measured supply frequency.

17. A measurement arrangement as defined in claim 11, **characterised** in that the control unit (220) comprises means (221, 223, 228) for measuring the supply current and supply voltage of the alternating-current motor and means (221, 222) for determining the power (P) of the alternating-current motor on the basis of the measured current value (I) and voltage value (U).

18. A measurement arrangement as defined in claim 11, **characterised** in comprising a first pressure sensor (244) for measuring a first static liquid pressure value prevailing in the pump input and a second pressure sensor (245) for measuring a second static liquid pressure value prevailing in the pump output, said liquid pressure (H) being disposed to be generated by determining the difference between the second static pressure value and the first static pressure value.

19. A measurement arrangement as defined in claim 11, **characterised** in comprising a first pressure sensor (244) for measuring a first static liquid pressure value prevailing in the pump input and a second pressure sensor (245) for measuring a second static liquid pressure value prevailing in the pump output, said liquid pressure (H) being disposed to be generated by determining the difference between the second static pressure value and the first static pressure value and by adding the dynamic pressure value to said difference.

20. A measurement arrangement as defined in claim 11, **characterised** in that the means (221, 222, 223, 228) for calculating the flow value are included in the control unit (220), the control unit being a frequency converter.

21. A measurement arrangement as defined in claim 20, **characterised** in that the control unit (220) comprises a processor (221) for controlling the operation of the control unit, said processor being disposed to perform calculation of the flow value.

22. A measurement arrangement as defined in claim 20, **characterised** in that the control unit (220) comprises a display (224) for displaying the determined flow

value and/or the control unit comprises means for transmitting the flow value data to a data transmission channel.

23. A measurement arrangement as defined in claim 20, **characterised** in that the control unit is disposed to use the determined flow value as the control parameter of the electric drive.